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Mississippi Pharmacists' Knowledge and Perceptions of ADHD in Children

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Mississippi Pharmacists' Perceptions and Knowledge of ADHD in Children

By

Anna Crider

A thesis submitted to the faculty of The University of Mississippi in partial fulfillment of
the requirements of the Sally McDonnell Barksdale Honors College

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ABSTRACT

Mississippi Pharmacists' Perceptions and Knowledge of ADHD in Children

Attention-deficit/hyperactivity disorder (ADHD) is a condition that has garnered more attention in the profession of pharmacy in recent years as a result of being more commonly diagnosed in both adult and pediatric populations. With new medications available, pharmacists need to be knowledgeable about how these products may affect patients, especially children. It is crucial to understand pharmacists' perceptions and knowledge of ADHD and its treatments to optimize their provision of treatment for these patients. Due to the lack of literature dedicated to pharmacists' knowledge, familiarity, confidence, and perceptions as it relates the condition of ADHD and its treatments, the objectives of this study are to measure community pharmacists' knowledge of, familiarity with, confidence in counseling for, and perceptions of, ADHD and associated treatments for children. The study objectives were met by employing a descriptive, cross-sectional design. Responses were generated using a self-administered survey that was distributed electronically to Mississippi pharmacists using Qualtrics Survey Software. The results of this study demonstrate that Mississippi pharmacists are generally knowledgeable and comfortable in their role as dispensers of ADHD medications for children and also in counseling patients and families about those medications. However, there still appears to be some need for supplemental education in the form of continuing education or enhanced pharmacy school education to reinforce pharmacists' knowledge about pharmacological treatments. Pharmacists were less knowledgeable and familiar with

diagnosis of ADHD and non-pharmacological treatments, which is expected given their practice area. The question to be asked is whether education for pharmacists in these latter areas is necessary, especially if they are not specialists in ADHD. It can be argued that pharmacists would benefit from training in ADHD outside of pharmacological treatments. As the most accessible healthcare professional, pharmacists are likely to be called on by families of patients with ADHD for guidance. Additionally, a collaborative healthcare team approach should be taken between doctor, pharmacist, and therapist to ensure the patient's ADHD is not only being handled through medication therapy, but through a holistic approach.

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List of Symbols and Abbreviations

ADD: Attention Deficit Disorder

ADHD: Attention-deficit/hyperactivity disorder

BRIEF: Behavior Rating Inventory of Executive Function

BS: Bachelor's Degree in Pharmacy

CBT: Cognitive Behavioral Therapy

CDC: Centers for Disease Control

CE: Continuing Education

CPTs: Continuous Performance Tests

CPT-II: Conners' Continuous Performance Test-II

C-2 or C-II: Schedule 2 Controlled Substance

DSM: Diagnostic Statistical Manual

IRB: Institutional Review Board

MS: Master's Degree in Pharmacy

MTA: Multimodal Treatment Study of Children with Attention Deficit Hyperactivity Disorder

PADDS: Pediatric Attention Disorders Diagnostic Screener

PharmD: Doctor of Pharmacy Degree

PhD: Doctor of Philosophy in Pharmacy

TOVA: Test of Variables of Attention

TTEFs: Target Tests of Executive Functioning

BACKGROUND

Description of the Problem

5.4 million children between the ages of 4 and 17 have been diagnosed with it as of 2007, and 2.7 million are receiving medical therapy due to it. Boys are almost three times more likely to have it than girls, but only 3-7% of school aged children have it (ADHD Data and Statistics in the USA). Attention Deficit Hyperactivity Disorder (ADHD) is an ever-present diagnosis on the rise in the minds of Americans. Over the last two decades, this disorder has grown from unknown to colloquial language throughout various communities, especially academic. In the United States, the western states have almost a ten-fold decrease in ADHD rates compared to the midwestern states; which include some of the highest with Kentucky at a 14.8% ADHD rate (ADHD by the Numbers: Facts, Statistics, and You).

Across all disciplines, the Centers for Disease Control (CDC) reports that 11% of American children have ADHD, a 42% increase in just a short eight years from 2003-2011 (ADHD by the Numbers: Facts, Statistics, and You). According to post-doctoral fellow Meg Reuland who works at the Judge Baker Children's Center in Boston, Massachusetts, young women are less represented in the diagnosis of ADHD due to the premise that young girls tend to show the inattentive symptoms of ADHD, as opposed to the obvious hyperactive symptoms more typically displayed in boys with ADHD. The inattentive symptoms go unnoticed because it appears that the girl is disinterested and spacey and not symptomatic of ADHD (Interview with Meg Reuland). The disorder is diagnosed far and wide not only across the United States, but also in European countries

and even Australia. The numbers will only continue to rise as more awareness and education is developed.

One in five American children diagnosed and living with ADHD is not receiving medicine or behavioral therapy for the condition. The medicinal therapy rates vary across the country with Louisiana, Kentucky, Indiana, Arkansas, North Carolina, and Iowa having the highest rates. Nevada, Hawaii, California, Alaska, New Jersey, Utah, and Colorado had the lowest rates of medicinal treatment (ADHD by the Numbers: Facts, Statistics, and You). Depending on the child's age and gender, the implementation of medication therapy varies. Children on the upper end of the age spectrum from around age 11-17 were more likely to be placed on medicine than those children in younger ages from 4-10. In addition, boys were more likely to be placed in medicinal treatment than women (ADHD Data and Statistics in the USA). Medicine is not the only route of treatment for ADHD patients, and many can be involved in behavioral therapy treatments.

Whether the patient undergoes medicinal or behavioral therapy, the diagnosis and treatment of ADHD is a burden not only to the family of the patient, but also to the country as a whole. The average yearly cost in total for an ADHD patient is \$14,576, and \$42.5 billion for Americans in general (ADHD by the Numbers: Facts, Statistics, and You). The expenses come from not only the treatment of the patient, but also the potential costs, such as crime, losing a job, and educational burdens that might arise.

ADHD Symptoms and Diagnosis

As ADHD flows through the minds of people, especially parents and teachers, the activities and engagement by children is under intense scrutiny. Every class, the teacher analyzes his or her students looking to see if they are well behaved or if they fidget, interrupt, and in general cannot sit still. The parent looks on to see if his or her child is able to sit and focus to study for a test or to complete homework. Anything out of the ordinary for the child is then explained as a possible symptom of ADHD. It is difficult, however, to determine the appropriate level of activity for a child and whether there is an appropriate base-rate for comparison. The Diagnostic Statistical Manual (DSM) attempts to develop this base-rate and depict a picture of what an ADHD patient is. Through the DSM, there is a list of symptoms and personality manifestations that indicate if a person or child has ADHD. In order for a child to be classified as having ADHD, the patient must exhibit at least six of the explicitly designated symptoms from an inattention group of criteria and/or the hyperactivity and impulsivity criteria (ADHD Fact Sheet). The symptoms must be present for at least six months and they must involve being inappropriate for the developmental level of the patient (Symptoms and Diagnosis). The list of the explicit behaviors indicating ADHD is provided in Tables 1 and 2 (Symptoms and Diagnosis).

Table 1: Inattention Symptoms of ADHD

1: Often fails to give attention to details or makes careless mistakes in school work, work, and/or other activities
2: Trouble holding attention on tasks
3: Does not listen when spoken to directly
4: Does not follow through on instructions and fails to finish work
5: Trouble organizing tasks and activities
6: Avoids, dislikes, or is reluctant to do tasks that use mental effort over a long period of time
7: Loses things that are necessary for a task or activity
8: Often easily distracted
9: Often forgetful in everyday activities

Table 2: Hyperactivity and Impulsivity Symptoms of ADHD

1: Fidgets with or taps hands or feet and squirms in seat
2: Leaves seat when expected to stay in the seat
3: Runs or climbs when inappropriate in situation
4: Unable to play or participate in calm activities quietly
5: "On the go" constantly
6: Talks excessively
7: Blurts out an answer before prompted to
8: Trouble waiting his or her turn
9: Interrupts or intrudes on others around him or her

Depending on the symptoms exhibited by a person in each of the tables previously mentioned, different presentations either combined, pre-dominantly inattentive, or pre-dominantly hyperactive-impulsivity of ADHD is diagnosed. A combined presentation involves having enough of the required symptoms from both the inattention and hyperactivity and impulsivity criteria. Predominantly inattentive presentation includes exhibiting symptoms in the inattentive category and none in the hyperactivity and impulsivity, and the inverse is identified in a predominantly hyperactive and impulsive presentation in which the person displays only those distinct characteristics. For each of the presentations mentioned previously a patient must exhibit

the symptoms of the classification for a minimum and continuous time span of 6 months (Symptoms and Diagnosis).

The symptoms listed in Table 1 and 2 come from an observational and recorded account by either the patient or a guardian or peer, and subject to personal interpretation. Clinicians and therapists alike have a variety of means to assess ADHD in a person, including using a computerized assessment called the Pediatric Attention Disorders Diagnostic Screener (PADDS), Continuous Performance Tests or CPTs, and Behavior Rating Inventory of Executive Function (BRIEF). Two examples of commonly accepted CPTs include the Test of Variables of Attention (TOVA) and the Conners' Continuous Performance Test-II (CPT-II). CPT is believed to be successful at screening the executive functioning skills of children that might be at a risk for developing ADHD. The CPT also is very beneficial for clinicians because it allows them to differentiate a person who has ADHD and a reading disorder from a person who only has a reading disorder. A study by DeShazo, Grofer, Lyman, Bush, and Hawkins in 2001 analyzed the difference in interpreting visual cues and prolonged attention in ADHD diagnosed and un-diagnosed children by using the CPT-II. Through the study, they discovered that ADHD children had comparable selective attention, exhibited through visual cues, to the un-ADHD diagnosed children, but their attention did not sustain for the same amount of time.

The TOVA screening has been used due to its success in differentiating an ADHD child from a non-ADHD child. In early research, the TOVA screen successfully identified 80% of those affected and 72% of the controls in the sample, but in the most research in 2005, the TOVA was discovered to not be able to distinguish between an ADHD child and a child with low levels of behavioral and ADHD problems. Overall, the

CPTs have a good positive predictive capacity for ADHD, such as a person performing poorly due to having ADHD, but a poor negative predictive capacity, in which doing well does not display any results. The results recovered by clinicians through CPTs are difficult often to interpret and appropriately assess a patient because ADHD has high co-morbidities with other disorders and varying levels of actions with each subtype (Reddy, Newman, Pedigo, & Scott, 2010).

In addition to CPTs, clinicians and therapists utilize the Behavior Rating Inventory of Executive Function (BRIEF) screening tool as a first analytical tool to evaluate a person's executive functioning skills, especially in school-aged children. Within the BRIEF, there are three aspects involved including a Behavior Regulation Index, a Metacognition Index, and a Global Composite. In recent testing and research, it has been discovered that the BRIEF testing tool classified ADHD children 82% of the time compared to the control, but the tool did not help separate and differentiate between those in clinical settings.

The Pediatric Attention Disorders Diagnostic Screener (PADDS) is a relatively new computerized attention and executive functioning screening tool. It implements Target Tests of Executive Functioning (TTEFs) and requires a person to engage in and complete three brief computer tasks. The testing and task set-up provided by the PADDS allows clinicians to more thoroughly assess executive functioning in children than the CPTs (Reddy, Newman, Pedigo, & Scott, 2010).

ADHD Treatment

Once a child is diagnosed with ADHD, the child and his or her family can choose to undergo both or either medicinal or cognitive behavioral therapy. Through research it has been discovered that medicinal therapy alone was more effective at treatment than behavioral therapy in managing ADHD, but using these two modes of therapy together was more effective than using the solely medicinal or behavioral therapy. In 2007, about 2.7 million children from the age of 4-17 were using medicinal therapy for his or her ADHD treatment plan.

In order for the best of outcomes for a child with ADHD, Cognitive Behavioral Therapy (CBT) should be used in addition to medicinal therapy. Cognitive behavioral therapy works by helping the child to control their impulsivity and redirect it into a more positive alternative behavior (McCarthy). Through the analysis of the child's behavior and thoughts, this type of therapy helps break down the child's challenges and overcome their negative thoughts. Implementing this therapy works through praising or giving presents to the child as a reward for acting and responding appropriately. This praise and reward is aimed to encourage the child to calm down enough to deal with school or other challenges he or she might face. Typical Cognitive Behavioral Therapy takes about 12 weeks of sessions, but several have gone on for as long as nine months. CBT is practical and crafted in order to allow the child to be able to develop and learn new skills. The key to effective CBT is having a certified, through the Association for Behavioral and Cognitive Therapies, and qualified therapist (Shute, 2010).

Behavior therapy works by not only improving the skills of the child with ADHD but also the parents'. The parents are equipped with better behavior techniques to help

them in their parenting of the child. This cooperation between parent and child creates an encouraging environment for the child to grow and develop skills in order to improve their ADHD symptoms. Psychologists with the American Psychological Association recommend that this form of treatment should be the first option for children under the age of five. Dr. William Pelham, Ph.D., director of the Center for Children and Families at the State University of New York, strongly encourages that children of all ages try this form of therapy before seeking medicinal therapy. Pelham explains that there is clear evidence that behavioral therapy will be effective for a majority of children, and if the child needs to be placed on medicinal therapy later in treatment, the child tends to receive a lower dose. Behavioral therapy, however, does take a lot of time and effort for the both the parent and child involved. The parent and child could work and be actively following the treatment plan and not see results until several weeks or months after beginning. This treatment plan is very intense for the parent and child because it requires that they both change the ways in which they behave and act and they have to continue these changes over time in order for the therapy to be effective (McCarthy).

The results from following a behavioral therapy treatment plan are long lasting and help the child to grow and develop important skills for him or her to function in everyday life. These results are not found, however, when a child undergoes medicinal therapy. If a child on medicinal therapy discontinues treatment, his or her ADHD symptoms can return, even if the patient had been diligently taking the medication for 10 years. Another downside to medicinal therapy is that if it is implemented first and is successful, the patient and his or her parent is less likely to seek behavioral therapy to improve or eliminate the ADHD symptoms completely. Medicinal therapy has

standardized results from drug companies and the medications guarantee an improvement almost immediately in ADHD symptoms and manifestations (McCarthy).

At the Judge Baker Children's Center in Boston, an institution geared toward treating children with varying psychological, behavior, and social disorders, the psychologists and professional personnel seek a behavioral therapy treatment option over a more cognitive one. Through a series of published literature on the treatment of ADHD, the psychologist at Judge Baker takes the parent of the child through a flow chart of steps to helping their child cope and hopefully overcome their symptoms. With each task broken down, the parents are given homework to make sure that each action the child does is separately and individually rewarded in order for the child to remain focused. At this center, personnel from the child's school is also brought in and encouraged to carry over the same actions that the parent does with the child at home. It is a collective effort for both the parents and the school to make sure the flow chart treatment method is being followed and incorporated throughout the child's environment. This method of treatment is very time consuming for parents and teachers alike, and for single parents the time of treatment can be prolonged due to the parent not having the available time to dedicate to working with their child. However, regardless of the time required, the treatment laid out through the psychologist's flow chart of behaviors and rewards can help a child to cope with and improve their ADHD symptoms. (Interview with Meg Reuland).

The Multimodal Treatment Study of Children with Attention Deficit Hyperactivity Disorder (MTA) in 1999 analyzed the treatments available for ADHD children and whether a combination treatment was more effective than a single treatment option. Through this study sponsored by the National Institute of Mental Health,

psychologists compared the use of medicinal or behavioral therapy alone to a combination therapy in which both methods were used. It was found that three years after this study 45-71 percent of the children in the original treatment groups were taking medications, but this treatment was not associated with better outcomes after about three years. Such a result caused Dr. Peter Jensen to claim “medication can make a long term difference for some children if it’s continued with optimal intensity and not started or added too late in a child’s clinical course”. In a follow up study, a research team evaluated 485 of the children from the original MTA study varying in ages from 10-13. Through this study, researchers were able to see that intensive medication management alone or in conjunction with behavioral therapy had better outcomes than just behavioral therapy or community care alone. Researchers in this study also found that children who had intensive behavioral therapy were more likely to begin taking medication, whereas those who had been taking medication and then started behavioral therapy were more likely to stop. Families and teachers responded to the study and they favored the combination of medication and behavioral therapy, and found that such a combination allowed for lower medication dosages. The study also revealed that the management of medication by an MTA physician instead of a community care source produced better outcomes (The MTA Cooperative Group, 1999).

This MTA study displayed the aspect, according to Dr. Brooke Molina, that ADHD treatment for one year does not prevent serious problems from occurring later. In support of such a statement, Brooke Molina and her colleagues found that children with ADHD had higher-than-normal rates of delinquency (27.1 vs. 7.4 percent) and substance abuse (17.4 vs. 7.8 percent). Through her analysis she also found that the lower amount

of substance abuse by children who received intensive behavioral lessened by the third year (The MTA Cooperative Group, 1999).

Medicinal Treatments for ADHD

In terms of options for medicinal therapy, a patient can be prescribed stimulants, or non-stimulants. The choice of stimulants includes Methylphenidate (Concerta, Methyl ER, Methylin, Daytrana, Ritalin, Ritalin LA, Ritalin SR, Metadate CD), Dextroamphetamine (Dexedrine/Dextrostat, Dextrine Spansule), Lisdexamfetamine (Vyvanse), Dexmethylphenidate (Focalin, Focalin XR), and Mixed amphetamine salts (Adderall, Adderall XR). Stimulants are the first choice of medication for ADHD patients because they are incredibly effective at enhancing the symptoms of ADHD including hyperactivity, impulsivity, and inattentiveness. The stimulants work by either inhibiting the reuptake of dopamine and norepinephrine, and/or increasing their release to the synaptic cleft to inhibit the catabolic or destructive ability of monoamine oxidase. Non-stimulant medications are often used only if the patient does not see or reach their desired results and experiences intense side effects while on stimulant medication. The choice of non-stimulants includes Atomoxetine (Strattera), Guanfacine extended-release (Intuniv), and Clonidine extended-release (Kapvay). Atomoxetine works by being a selective noradrenergic reuptake inhibitor and inhibits the presynaptic norepinephrine transporter. Guanfacine is a specific alpha-2 adrenergic agonist, and Clonidine is a nonspecific alpha-2 adrenergic agonist. These both function by binding to postsynaptic alpha-2A-adrenoreceptors in the prefrontal cortex. Through this binding, there is an increase in the release of the prefrontal cortex neurons that help control attention, impulse control, and other functions that are not well monitored in ADHD.

Side effects with stimulant medication include nausea, vomiting, abdominal pain, headache, insomnia, decrease in appetite, and weight loss. In several studies, it has been found that stimulants improve mood and irritability. A report by James Swanson and his colleagues, based off of the MTA study previously mentioned, confirmed the idea that medication slowed growth. In a group of 65 children with ADHD and no medication, these children were about three-fourths of an inch taller and six pounds heavier on average than a comparative group of 88 children on medication. The growth rates of the children in the study, however, normalized after three years (The MTA Cooperative Group, 1999).

Stimulant medications also have a high potential for abuse and may cause underlying tics to resurface. Atomoxetine, a non-stimulant medication, can cause nausea, vomiting, abdominal pain, headache, somnolence, and decrease in appetite. This medication has the potential to increase suicidal thoughts in patients and worsening or new psychiatric problems should be reported if they develop while on this medication. The other non-stimulant medications, including Guanfacine and Clonidine, have side effects that involve headache, insomnia, somnolence, fatigue, abdominal pain, and xerostomia. When administering the previously mentioned medications, extra precaution should be used to make sure the child does not have a history of cardiovascular disease, hypotension, or syncope. If either Guanfacine or Clonidine is discontinued suddenly, hypertension could rebound (Lardieri, Morgan, & Vy Nguyen, 2015).

Role of the Pharmacist in ADHD Treatment

Given the extent of medicinal therapy for children with ADHD, the pharmacist plays many roles in helping pediatric patients and their parents manage ADHD treatment. A pharmacist should instill the concept of medication adherence to their patients. By informing patients of potential side effects, results, and benefits, a pharmacist can provide a patient with the incentive to continue to take his or her medication on a regular and diligent basis. A pharmacist can also help with medication adherence by encouraging patients to have multiple follow-up visits with his or her physician in order to ensure the medication is appropriate. Through their knowledge of titrations and dosing formulations such as extended-release and transdermal delivery options, a pharmacist can accommodate the lifestyles of patients and make it easier for him or her to take their medication as prescribed (Manos, Tom-Revzon, Bukstein, & Crimson, 2007).

When reviewing and filling prescriptions for ADHD medication therapy, a pharmacist should be able to discern whether or not the physician is following the correct dosing protocol. When a physician is beginning a patient on such medication, the physician should prescribe a dose and then wait. After the initial dose, the physician can gradually increase the dose until the ADHD behavior improves. The physician can continue to increase the dosage from this point on until side effects begin to appear. Once side effects begin to develop, the physician should lower the dose to the original amount before the side effects began to be displayed (Manos, Tom-Revzon, Bukstein, & Crimson, 2007).

For the side effects of reduced appetite, weight loss, and slowed growth, the pharmacist should be able to help guide parents in additional steps they can take to

reverse or lower such side effects. The pharmacist should monitor the weight, height, and body mass index of the patient every six months to make sure there is not a severe gap in growth and development. For the loss of appetite side effect, the pharmacist should inform the parents to give their child medication after eating and make sure the child has high-energy snacks and late night meals if necessary in order to maintain weight. If the weight loss and growth are severe, the pharmacist has the ability to question if the dosing of the medication should be changed.

Children should also be monitored for the potential side effect of high blood pressure or heart rate and other cardiovascular problems. Before beginning any of the stimulant based medications, the pharmacist should confirm that the child does not have any previous history of cardiac problems or genetic risk factors. The pulse and heart rate of the patient should also be noted before the child begins treatment. It is crucial that the pharmacist informs the patient to seek a physician if his or her heart rate is above 120 beats per minute or in a state of persistent tachycardia, and the physician can then determine if the dosage of the medication should be altered (Lardieri, Morgan, & Vy Nguyen, 2015).

Pharmacists should describe to patients and families how to look for signs and risk factors of abuse or misuse of stimulants used for ADHD therapy. If the pharmacist observes a patient misusing a drug, the patient should be referred to the clinician. Once the patient seeks treatment, the addiction or abusive behavior is treated first and then the ADHD symptoms and manifestations will be treated. After treatment, the pharmacist should continue to monitor the patient's use of stimulants, and if there is believed to be a

high chance the patient will abuse, a pharmacist should seek to change from a stimulant based therapy to an atomoxetine-based option.

Pharmacists should inform patients and their parents about the potential side effects of ADHD medications and encourage such patients and their parents to keep their physician up to date on the progress of their symptoms and any improvements or setbacks he or she might experience from the medication. Because the pharmacist sees the patient on a more regular basis than a physician, the pharmacist should observe the patient for side effects and report such observations to the physician in case the course of treatment should be changed. The pharmacist should work with the physician to make sure the medication therapy is appropriate and necessary for the patient (Lardieri, Morgan, & Vy Nguyen, 2015).

Community Pharmacists' Familiarity, Knowledge, Counseling Confidence, and Perceptions

Because community pharmacists play such a key role in ADHD treatment, it is important to know pharmacists' 1) familiarity with ADHD, 2) knowledge of ADHD, 3) confidence in counseling children and families with ADHD, and 4) perceptions of ADHD. Any lack of familiarity, knowledge, confidence or misperceptions may need to be addressed through pharmacist education to fully optimize a patient's medicinal therapy for ADHD. Unfortunately, there is a lack of literature to inform these issues, and the literature available is outdated and has not resulted in positive findings.

A study conducted in 2008 by Ghanizadeh reported that pharmacists lack knowledge about ADHD treatments. Through a self-reported questionnaire, pharmacists were surveyed on their knowledge and perceptions of Ritalin use for ADHD. Among the results, a majority of pharmacists, about 91%, believed that ADHD misbehavior was due

to children refusing to follow rules and finishing assignments, while only about 40% of pharmacists believed ADHD had biological and genetic vulnerabilities and causation. With regard to treatment, 85.5% of these pharmacists said that Ritalin is used for improving concentration and 80% of them believed it was the best medication option available. Surprisingly though, 70% of pharmacists believed that Ritalin should not be taken for ADHD, except for in very severe cases.

This study revealed that there is a rather large gap between the knowledge and perception of Ritalin usage in ADHD patients. Through this study, it was discovered that only a few pharmacists surveyed had the opportunity to learn about ADHD, and that most pharmacists do not have any more knowledge in identifying the characteristics of ADHD than teachers in school do. The results of this study displayed the concept that more information and educational material, especially in the topic of pharmacology, should be provided to pharmacists regarding ADHD treatment (Ghanizadeh, 2008).

Study Objectives

Due to the lack of literature dedicated to pharmacists' knowledge, familiarity, confidence, and perceptions, the objectives of this study are to:

1. To measure community pharmacists' ***familiarity*** with ADHD and associated treatments for children.
2. To measure community pharmacists' ***knowledge*** with ADHD and associated treatments for children.
3. To measure community pharmacists' ***confidence*** in counseling ADHD patients and their families.

4. To measure community pharmacists *perceptions* of ADHD and associated treatments for children.

The secondary objectives of this study were to test for differences in familiarity, knowledge, confidence, and perceptions based on type of degree (Bachelor's Degree in Pharmacy versus Doctor of Pharmacy Degree) and type of pharmacy worked in (independent pharmacy versus retail chain pharmacy).

METHODS

Design

The study objectives were met by employing a descriptive, cross-sectional design. Responses were generated using a self-administered survey that was distributed electronically to Mississippi pharmacists through Qualtrics Survey Software.

Sample

The study sample consisted of Mississippi-licensed pharmacists who had valid email accounts, acquired from the state board of pharmacy on October 7, 2016. The study sample was limited to Mississippi-licensed pharmacists who practice in a field in which they dispense ADHD medication. Mississippi-licensed pharmacists who work in a clinic, hospital, or academic setting were excluded from completing the survey upon answering that they worked in a setting that did not dispense ADHD medication. A total of 6,872 emails were sent to Mississippi-licensed pharmacists.

Data Collection

Prior to sending the survey to Mississippi-licensed pharmacists, an Abbreviated IRB Application was submitted to the University of Mississippi IRB for approval to begin data collection. The University of Mississippi IRB approved the application as exempt under 45 CFR 46.101(b)(#2). The study to be completed by the pharmacists was conducted by first using an online survey generated by the Qualtrics Survey Software. The survey generated may be found in Appendix A. The link to complete the survey was sent to the sample described above in an email that explained both the survey and the

purpose of the study. Following the initial sending of the survey, a week later another email was sent to those in the sample that had not yet completed the survey. The follow-up email also contained the link to the survey and a reminder of the purpose of the study. The body of the initial and follow-up emails may be found in Appendices B and C.

The survey began by asking the primary practice setting of the pharmacist. If the participant answered working in a clinic that does not dispense ADHD medications, a hospital, or any other setting individually inputted the individual was excluded from the rest of the survey. If the participant answered with working in a chain or independent community pharmacy or a clinic that dispenses ADHD medication the individual was prompted to continue the survey and answer educational and demographic information. Questions included age, sex, ethnicity/race, years of practicing pharmacy, pharmacy practice job title, pharmacy training/education, and number of weekly prescription ADHD dispensing and refills.

Following these background questions, the survey developed into questions that tested the familiarity of the participant with ADHD symptoms, behaviors, diagnostic testing, and medications, including side effects and resources. Based upon the individual's familiarity with a certain aspect of ADHD, the participant was asked to indicate by choosing a number 1 through 5 (1 being not at all familiar and 5 being extremely familiar).

The survey then continued by testing the knowledge of the participants on different ADHD medication types, categories, as well as, dispensing protocols and side effects. There were also questions to test the knowledge of individuals on ADHD preconceptions and statistics.

In the final section of the survey, the participant was asked to indicate their confidence in counseling on ADHD medications and voice their opinions or perceptions of ADHD medications and prescriptions. Statements regarding counseling asked about the individual's confidence in their ability to inform patients about medication side effects and their confidence in dispensing the appropriate medication. Based upon the statement made, the individual indicated on a scale of 1 to 5 (1 being strongly disagree and 5 being strongly agree) their confidence in the certain situation. This part also asked whether participants believed there should be more continuing education courses or curriculum in pharmacy school dedicated to ADHD medication therapy.

In the perceptions aspect of the survey, individuals were able to agree or disagree on a scale of 1 to 5 (1 being strongly disagree, 3 being neither agree nor disagree, and 5 being strongly agree) whether they believe ADHD diagnosing is on the rise, or if children are misdiagnosed or inappropriately treated and not thoroughly informed of their condition.

The last question was an essay or open-ended question that asked about the individual's final thoughts or additional concerns on the topic of ADHD and the research study.

Analysis

Sample description. The pharmacist sample was described by calculating frequencies, means, and percentages for the demographic characteristics of the pharmacist respondents.

Pharmacists' familiarity. Frequencies and percentages were used to assess the familiarity of pharmacist with ADHD symptoms, medications, treatment options, screening tools, and resources.

Pharmacists' knowledge. Frequencies and percentages were used to describe the knowledge of pharmacists on ADHD symptoms in children, drug therapy, and medication options.

Pharmacists' confidence. Frequencies and percentages were implemented to analyze the confidence of pharmacists in dispensing and counseling ADHD medications to patients.

Pharmacists' perceptions. Frequencies and percentages were calculated to assess the perceptions of pharmacists on the usage and prescribing of ADHD medications in children.

Differences testing. To meet the secondary objective of this study, Pearson Chi Square tests of Independence were used at a .05 level of significance to test for differences in familiarity, knowledge, confidence, and perceptions based on type of degree (Bachelor's Degree in Pharmacy versus Doctor of Pharmacy Degree) and type of pharmacy worked in (independent pharmacy versus retail chain pharmacy).

RESULTS

Response Rate

Through the Qualtrics Survey Software, 6,782 emails were sent to Mississippi Pharmacists and 676 surveys were completed which yielded an initial response rate of 9.83%. Through the initial screening questions, however, pharmacists who worked in a clinic that did not dispense ADHD medications, a hospital pharmacy, or other setting not listed were not qualified to finish the survey and were prompted to the end of the survey. Out of the 676 respondents, 368 of them qualified to complete the entire survey. There were 48 surveys that were not completed by participants who qualified. As a result, 320 surveys were used in final data analysis.

Sample Description

Of the 320 respondents, most were female, white/Caucasian, had a Doctor of Pharmacy Degree (PharmD) as their most advanced pharmacy training, worked in a retail chain setting in a rural area, were staff/employee pharmacists, and did not recall having ADHD training in their pharmacy degree program and had not taken a continuing education program or other ADHD training after graduation. Table 3 summarizes the demographic characteristics of respondents.

The average age of the 318 participants (2 participants did not answer) was 43.31 with a standard deviation of 13.45 and the minimum and maximum age of 24 and 81, respectively. Of the participating pharmacists, the average years practicing was 17.26 with a standard deviation of 14.60 and a minimum and maximum of 0 and 58. There were

312 respondents reported his or her weekly prescription fill numbers and the average was 1887.89 with a standard deviation of 1330.00 and a minimum and maximum of 20 and 8000. Of the 315 responses available regarding ADHD prescription fills in a week, the average number was 95.10 with a standard deviation of 188.18 and a minimum and maximum of 0 and 2000.

Table 3: Demographic Characteristics

Gender	Number of Respondents (%)
Female	186 (58.1)
Male	134 (41.9)
Race/Ethnicity	Number of Respondents (%)
White/Caucasian	278 (86.9)
African American/Black	18 (5.6)
Asian/Indian Asian	15 (4.7)
Hispanic	3 (0.9)
American Indian/Alaskan Native	1 (0.3)
Native Hawaiian/Other Pacific Islander	0 (0)
Other	5 (1.6)
Most Advanced Pharmacy Training	Number of Respondents (%)
Doctor of Pharmacy (PharmD)	193 (60.3)
Bachelor's Degree in Pharmacy (BS)	121 (37.8)
Master's Degree in Pharmacy (MS)	3 (0.9)
Doctor of Philosophy in Pharmacy (PhD)	3 (0.9)
Type of Pharmacy	Number of Respondents (%)
Retail chain pharmacy	194 (60.6)
Independent pharmacy	122 (38.1)
Clinic that dispenses ADHD medication	4 (1.3)
Location of Pharmacy	Number of Respondents (%)
Rural (less than 50,000 people)	176 (55)
Metropolitan (greater than 50,000 people)	144 (45)
Job Title	Number of Respondents (%)
Staff/Employee Pharmacist	161 (50.3)
Manager/Pharmacist in Charge	152 (47.5)
Other	7 (2.2)
ADHD Instruction in Pharmacy School	Number of Respondents (%)
No	163 (50.9)
Yes	89 (27.8)
Maybe	68 (21.3)
Continuing Education Program in ADHD	Number of Respondents (%)
No	219 (68.4)
Yes	101 (31.6)

Pharmacists' Familiarity

Across all valid responses recorded, pharmacists displayed a slight, moderate, and very familiar response pattern. Table 4 below describes in detail respondents' ratings of familiarity for each of the six items. Bolded numbers indicate most frequently chosen category for each item. No significant differences in respondents' familiarity with ADHD were found when comparing location of practice (independent pharmacy versus chain pharmacy) or level of training (BS vs. PharmD).

Table 4: Pharmacists' Familiarity with ADHD

Please indicate how familiar you are with each of the following statements by selecting the one choice which best describes your familiarity	Extremely Familiar Freq. (%)	Very Familiar Freq. (%)	Moderately Familiar Freq. (%)	Slightly Familiar Freq. (%)	Not Familiar at All Freq. (%)
Symptoms of ADHD	43 (13.4)	102 (31.9)	148 (46.3)	27 (8.4)	0 (0)
Medications that are used to treat ADHD	86 (26.9)	155 (48.4)	73 (22.8)	6 (1.9)	0 (0)
Side effects from medications used to treat ADHD	48 (15)	142 (44.4)	117 (36.6)	13 (4.1)	0 (0)
Non-pharmacological treatments used to manage ADHD	17 (5.3)	38 (11.9)	142 (44.4)	82 (25.6)	41 (12.8)
Screening tools available for ADHD patients	12 (3.8)	32 (10)	92 (28.8)	114 (35.6)	70 (21.9)
ADHD resources that can be used by patients and other healthcare professionals	15 (4.7)	26 (8.1)	81 (25.3)	110 (34.4)	88 (27.5)

Pharmacists' Knowledge

In terms of knowledge on ADHD related symptoms, treatments, and diagnosing, a large majority of responding pharmacists were able to correctly recognize all of the true/false statements except for statement 2 in which a majority incorrectly answered this statement as true (see Table 5, below). Bolded numbers indicate most frequently chosen category for each item. Pearson Chi Square tests demonstrated that more PharmD respondents answered the true/false statements correctly as true compared to those with a BS in statement 1 ($X^2 = 6.26$; $p \leq .044$) and 4 ($X^2 = 7.73$; $p \leq .021$) (Figures 1 and 2, respectively), but had a higher percentage incorrectly answering true in statement 2 ($X^2 = 6.56$; $p \leq .037$) (Figure 3). When tests were run comparing chain and independent pharmacists, there was only a difference in responses for statement 6 in which more chain pharmacists recognized it correctly as false than independent pharmacists ($X^2 = 9.42$; $p \leq 0.009$) (Figure 4).

Table 5: Pharmacists' Knowledge of ADHD

Please indicate whether the following statements are True (T) or False (F)	TRUE Freq. (%)	FALSE Freq. (%)	I Don't Know Freq. (%)	Not Answered Freq. (%)
Children with ADHD have higher-than-normal rates of delinquency and substance abuse	181 (56.6)*	69 (21.6)	70 (21.9)	0 (0)
Patients have to exhibit symptoms of ADHD for a minimum of 3 months to be diagnosed with ADHD and receive treatment	134 (41.9)	89 (27.8)*	97 (30.3)	0 (0)
Drug therapy only has to be followed by a patient for 10 years, after which the patient will maintain their new non-ADHD behavior	6 (1.9)	236 (73.8)*	78 (24.4)	0 (0)
Stimulant medication has been demonstrated to slow growth in children	139 (43.4)*	107 (33.4)	74 (23.1)	0 (0)
Young girls are more likely to be diagnosed with ADHD due to hyperactive behaviors than young boys	11 (3.4)	274 (85.6)*	35 (10.9)	0 (0)
ADHD medications follow a proper dosing protocol as determined by the physician and the dose cannot change even if there are side effects	7 (2.2)	298 (93.1)*	15 (4.7)	0 (0)
Clonidine and Guanfacine are stimulant medications for ADHD	40 (12.5)	270 (84.4)*	10 (3.1)	0 (0)
Strattera (or Atomoxetine) is a selective noradrenergic reuptake inhibitor inhibiting the presynaptic norepinephrine transporter	255 (79.9)*	22 (6.9)	42 (13.1)	1 (0.3)

*indicates the correct answer

Figure 1: Knowledge Item 1 Responses between BS and PharmD Respondents

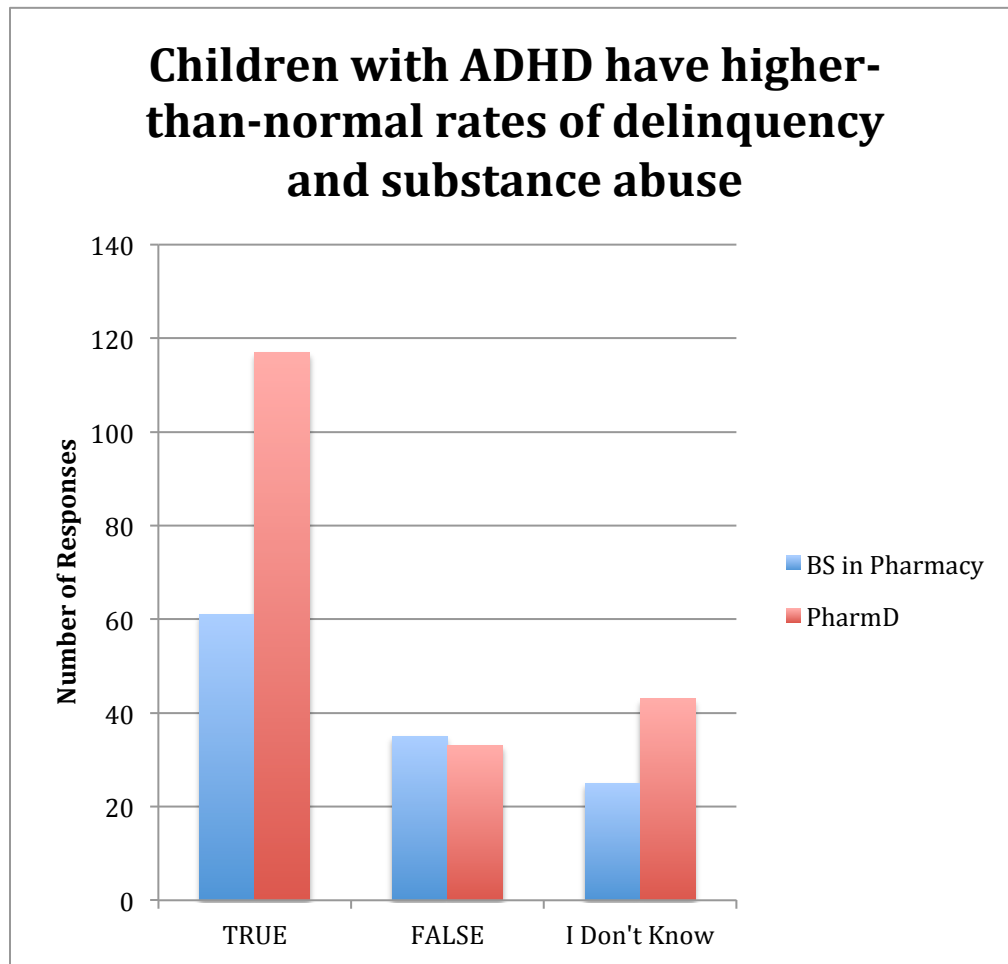


Figure 2: Knowledge Item 4 Responses between BS and PharmD Respondents

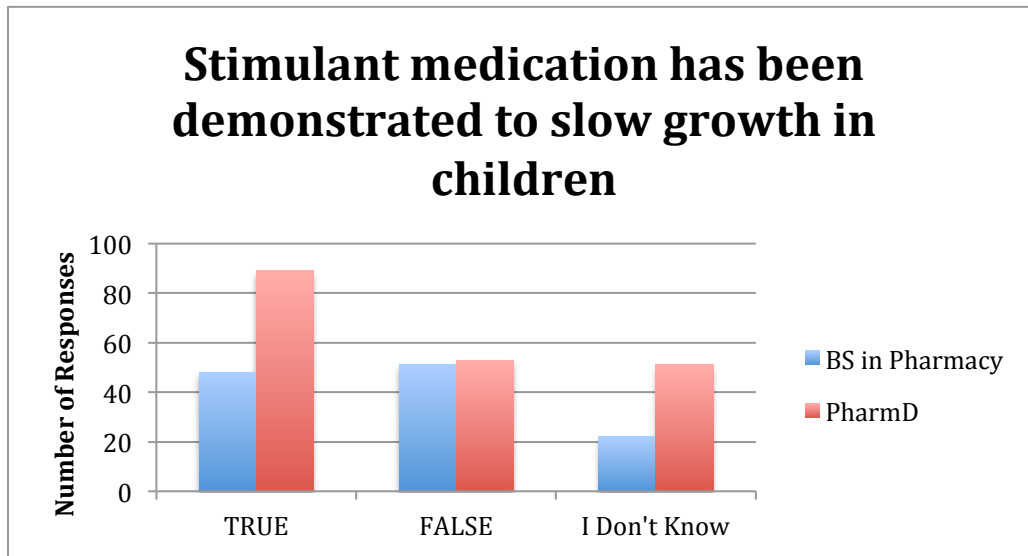


Figure 3: Knowledge Item 2 Responses between BS and PharmD Respondents

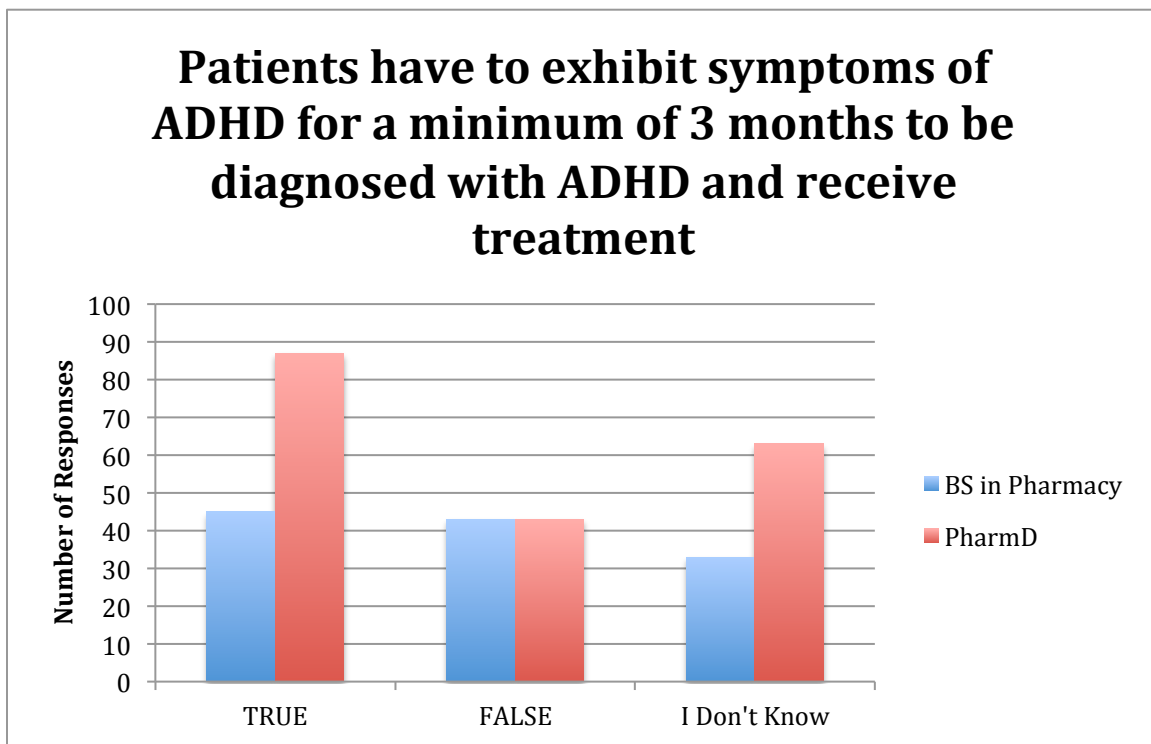
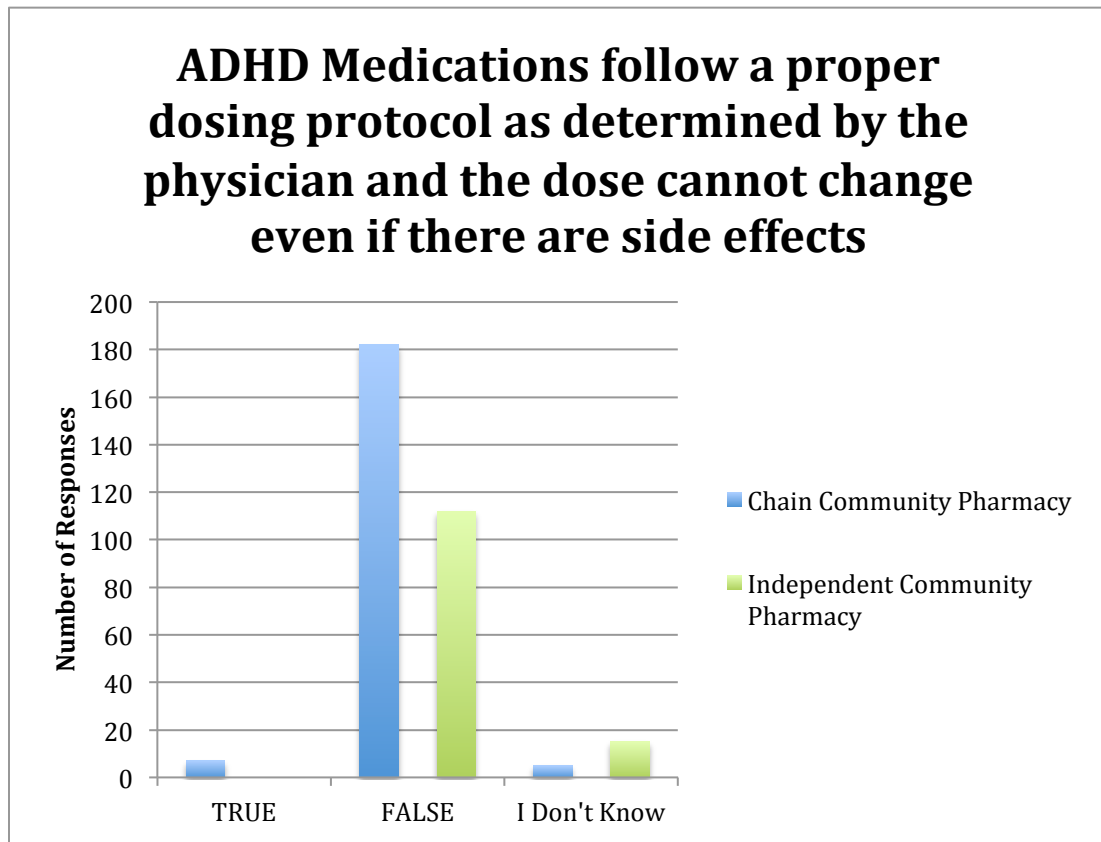


Figure 4: Knowledge Item 6 Responses between Independent and Retail Chain Pharmacists



Pharmacists' Confidence

A majority of pharmacy respondents agreed with the items addressing confidence (Table 6). Bolded numbers indicate most frequently chosen category for each item. No significant differences in respondents' confidence with ADHD were found when comparing location of practice (independent pharmacy versus chain pharmacy) or level of training (BS vs. PharmD).

Table 6: Pharmacists' Confidence with ADHD*

Please indicate the extent to which you agree with each of the following statements by selecting the one option which best describes your opinion	Strongly Disagree Freq. (%)	Disagree Freq. (%)	Somewhat Disagree Freq. (%)	Neither Agree or Disagree Freq. (%)	Somewhat Agree Freq. (%)	Agree Freq. (%)	Strongly Agree Freq. (%)
I feel confident in my ability to counsel patients about the medication profile and side effects of medications being used for the treatment of ADHD	7 (2.2)	6 (1.9)	16 (5.0)	16 (5.0)	116 (36.6)	120 (37.9)	36 (11.4)
I feel comfortable dispensing medications used in the treatment of ADHD	10 (3.2)	8 (2.5)	18 (5.7)	10 (3.2)	62 (19.6)	155 (48.9)	54 (17.0)
I feel that I could benefit from taking a continuing education or training program in the area of ADHD	10 (3.1)	2 (0.2)	2 (0.2)	13 (4.1)	27 (8.5)	142 (44.8)	121 (38.2)
I feel that pharmacy school curricula should include instruction in the area of ADHD	5 (1.6)	5 (1.6)	4 (1.3)	15 (4.7)	33 (10.4)	148 (46.7)	107 (33.8)

*Three respondents did not complete this section of the survey

Pharmacists' Perceptions

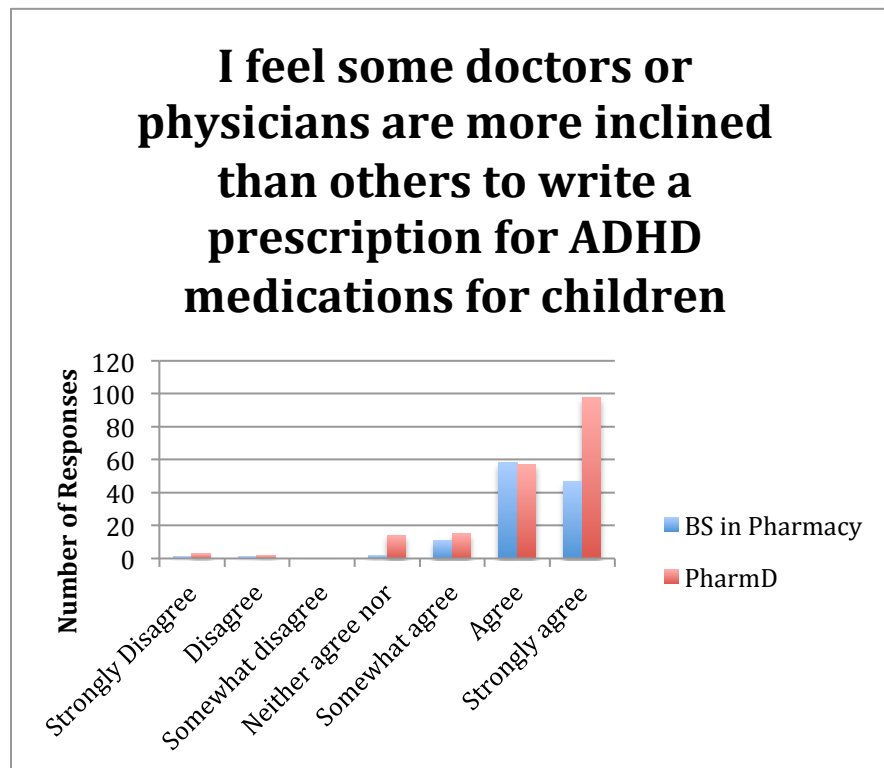
A majority of pharmacy respondents agreed or strongly agreed with perception items (Table 7). Bolded numbers indicate most frequently chosen category for each item. The second perception item, “I feel some doctors or physicians are more inclined than others to write a prescription for ADHD medications for children” was different between participants with a BS and a PharmD degree ($X^2 = 14.20$; $p \leq 0.014$). More PharmD participants “neither agree nor disagree” and “strongly agree” than those participants with a BS degree (Figure 5).

Table 7: Pharmacists' Perceptions of ADHD*

Please indicate the extent to which you agree with each of the following statements by selecting the one option which best describes your opinion	Strongly Disagree Freq. (%)	Disagree Freq. (%)	Somewhat Disagree Freq. (%)	Neither Agree or Disagree Freq. (%)	Somewhat Agree Freq. (%)	Agree Freq. (%)	Strongly Agree Freq. (%)
I feel there has been a rise in ADHD medication usage by children under the age of 12	3 (1.0)	2 (0.6)	2 (0.6)	16 (5.1)	17 (5.4)	115 (36.5)	160 (50.8)
I feel some doctors or physicians are more inclined than others to write a prescription for ADHD medications for children	4 (1.3)	3 (1.0)	1 (0.3)	16 (5.1)	26 (8.3)	119 (37.8)	146 (46.3)
I feel many children are inappropriately diagnosed with ADHD	2 (0.6)	10 (3.2)	5 (1.6)	19 (6.0)	66 (21.0)	108 (34.3)	105 (33.3)
I feel that physicians and doctors fail to emphasize behavioral therapy in addition to medication therapy	1 (0.3)	3 (1.0)	8 (2.5)	26 (8.3)	37 (11.7)	120 (38.1)	120 (38.1)

*Five respondents did not complete this section of the survey

Figure 5: Perception Item 2 Responses between BS and PharmD Respondents



DISCUSSION

This study's overarching goal was to determine Mississippi's familiarity, knowledge, confidence, and perceptions of ADHD and its treatments. The secondary objective was to discern whether there was a difference in these areas between independent and chain community pharmacists, as well as, between pharmacists with a BS degree versus a PharmD.

Familiarity

Across all valid responses recorded, pharmacists displayed a slight, moderate, and very familiar response pattern which indicates that pharmacists currently practicing have a good concept and working comfort with dispensing ADHD medications and counseling on side effects, treatment options, and other resources available. Not surprisingly, pharmacists reported their highest levels of familiarity with the items, "medications that are used to treat ADHD" and "side effects from medications used to treat ADHD". Self-reported familiarity appeared to lessen when assessing items less related to pharmacological therapies, suggesting that pharmacists are less familiar with these areas of ADHD diagnosis and treatment. Therefore, there may be some value in continuing education (CE) for pharmacists that focuses on symptoms, non-pharmacological treatments, screening tools and ADHD resources in addition to CE that focuses on medicinal treatment. Some respondents did convey related comments at the end of their survey. One respondent said, "Instruction from pharmacy school other than teach yourself would be helpful but a ce would be great for ongoing information." Another

respondent indicated, “If there are any current ADHD/ADD CE available please send the links.”

Pharmacists’ Knowledge

In terms of knowledge on ADHD related symptoms, treatments, and diagnosing, a large majority of responding pharmacists were able to correctly recognize all of the true/false statements except for the statement, “Patients have to exhibit symptoms of ADHD for a minimum of 3 months to be diagnosed with ADHD and receive treatment.” For this item, a majority incorrectly answered this statement as true. Additionally, more respondents indicated, “I don’t know” for this statement than any other statement. This may have been due to the specificity of the item with regard to diagnosis of ADHD, which is not an area a pharmacist would likely have advanced training in. Not surprisingly, pharmacists again performed well with items that pertained to drug treatments. These were also items where an answer of “I don’t know” was seen least frequently.

Significantly more PharmD respondents answered the statements, “Children with ADHD have higher than normal rates of delinquency and substance abuse” and “Stimulant medication has been demonstrated to slow growth in children” correctly to be true compared to those with a BS as their highest degree. While it is difficult to explain why more PharmD graduates than BS graduates answered the first item above correctly to be true, it may be that they answered the second item above to be true due to more advanced clinical training. Interestingly, these same PharmD respondents had a higher percentage incorrectly answering true for the statement, “Patients have to exhibit symptoms of ADHD for a minimum of 3 months to be diagnosed with ADHD and

receive treatment. It would have been expected to see an opposite trend given the more extensive clinical training of PharmD graduates. However, when it comes to the area of diagnosis in ADHD, this may be an area all pharmacist struggle with due to lack of training in this area. As previously described, this might be a helpful area of instruction for pharmacists' CE.

When responses from chain and independent pharmacists were compared, there was only a difference in responses for the statement, "ADHD medications follow a proper dosing protocol as determined by the physician and the dose cannot change even if there are side effects," in which more chain pharmacists recognized it correctly as false as independent pharmacists. Perhaps it is possible that chain pharmacists, due to higher prescription volumes, have more experience in seeing dosing protocols for ADHD and watching those protocols change and symptoms are experienced by the patient.

Confidence

A majority of pharmacy respondents agreed with the items addressing confidence as it relates to counseling patients and dispensing ADHD medications. At the same time, respondents did indicate a need for additional education in the form of CE or more instruction in pharmacy school. No significant differences in respondents' confidence with ADHD were found when comparing location of practice (independent pharmacy versus chain pharmacy) or level of training (BS vs. PharmD). One respondent did indicate at the end of the survey that they "Often feel somewhat inadequate in counseling parents on treatment options"

Perceptions

A majority of pharmacy respondents agreed or strongly agreed with perception items: “I feel there has been a rise in ADHD medication usage by children under the age of 12”, “I feel some doctors or physicians are more inclined than others to write a prescription for ADHD medications for children”, “I feel many children are inappropriately diagnosed with ADHD”, “I feel that physicians and doctors fail to emphasize behavioral therapy in addition to medication therapy”. The second perception item, “I feel some doctors or physicians are more inclined than others to write a prescription for ADHD medications for children” resulted in significantly different responses between participants with a BS and a PharmD degree. More PharmD participants “neither agree nor disagree” and “strongly agree” than those participants with a BS degree. Overall, pharmacists appeared to agree that there is an emphasis on medication therapy for the treatment of ADHD. However, pharmacists may be certainly biased toward this view given that their primary exposure of ADHD patients is in the pharmacy whereby patients are receiving medications. At the end of the survey, some respondents did provide comments suggesting that overprescribing for ADHD, especially stimulants may be an issue.

“Over the past 5 years there has been a MASSIVE increase in the number of stimulant prescriptions for both adults and children. I see a lot of NPs writing for stimulants now in the course of general/family practice. Stimulants are the go to drugs. I rarely ever dispense clonidine or Guanfacine. Despite being CIIIs I don't think patients or providers exercise enough caution regarding the addictive nature of the drugs or the potential for side effects. Pharmacists are caught in the middle. The current situation reminds me of the early days of the opioid use epidemic that the entire country is struggling with now.”

“In my opinion, there are children who are both misdiagnosed with ADHD and under diagnosed with ADHD. Parents and physicians are sometimes too eager to prescribe medications based on the child's behavior rather than looking at the

entire picture. Many children are prescribed ADHD medications to "control" or "calm" the child when behavior modification is all that is needed. Medicating the child is the easy way out and requires less effort on all those involved. Basically, doctors are allowing parents who should perhaps be better at parenting the easy way out by drugging up these kids. On the other hand because these medications are over-prescribed, those physicians who should diagnose and prescribe ADHD medications for those who truly have ADHD do not prescribe medications for those who would truly benefit. Fear of over-prescribing has dictated how many of the physicians treat those with ADHD."

"When I graduated I was instructed that the dispensing of these C-2 narcotics to children would have been considered highly unethical. Further, we were taught that by definition, these c-2 medications are highly addictive and any drugs in this category could only be used long term, ethically, for terminal illnesses or very rare unbearable pain situations (i.e. tragic car accident). There is an unprecedented drug epidemic in society which is significantly contributed to by the grossly inadequate education and training of health care professionals by educational institutions."

"I also feel that the early, constant and even high doses of amphetamine based stimulants is a roadmap for future psychological abnormalities (ie Depression, Anger, Schizophrenia). I feel that non-amphetamine based treatment protocols along with tedious behavioral modification therapy should be used as first-line treatment."

"We need long-term data about the effects of stimulant use over extended periods of time on brain development and function. We need data about abuse of adhd meds by the adult population (college students, healthcare providers, etc.)."

"By not doing proper diagnosing of ADHD our children are at the risk of depending on these potent drugs and suffer the consequences of the side effects. There should be behavioral therapy mandatory before doctors are allowed to start patients on ADHD medications."

"Over the past 10 years, I've worked in 2 different retail chain pharmacies. These 2 pharmacies are only 10 miles apart, fill approx the same number of scripts, but are in 2 very different socioeconomic areas. I was shocked that my pharmacy in the wealthier area (a Target pharmacy), with primarily upper middle class customers filled probably 10 times the volume of ADHD meds for children AND adults. The same also being true for anti-depressant medications which filled our "fast-mover" shelves. I was more than a little shocked! We even have entire families that are all on ADHD meds. Wayyyy over prescribed in my opinion."

"In the area in which I practice pharmacy, I see a higher than average number of ADHD medications dispensed to children specifically. Although I have received positive feedback from parents, I agree both parents and doctors alike are more inclined to dispense these medications as opposed to behavioral therapy."

To other pharmacists, overprescribing is not an issue.

“I believe it is important to discuss the benefits / adverse reactions with parents but I strongly believe that physicians are diagnosing and prescribing very well. I am ADD and strongly favor the benefits of properly-prescribed medications.”

“We are dispensing 1/4 of the number of ADHD prescriptions now versus a decade ago. I don't know why, but we have relatively few rx's for children for ADHD.”

Limitations

There are several limitations to this study that need to be considered when interpreting the results. It should be clear that the items in this survey, although developed from a literature review, have not been validated. This survey was administered in a small local sample of pharmacists therefore the results are not generalizable to a broader population of pharmacists outside of Mississippi. Finally, some social desirability bias is expected in a survey that is assessing areas like familiarity, knowledge, confidence, and perceptions.

Conclusions

The results of this study demonstrate that Mississippi pharmacists are generally knowledgeable and comfortable in their role as dispensers of ADHD medications for children and also in counseling patients and families about those medications. However, there still appears to be some need for supplemental education in the form of CE or enhanced pharmacy school education to reinforce pharmacists' knowledge about pharmacological treatments. Pharmacists were less knowledgeable and familiar with diagnosis of ADHD and non-pharmacological treatments, which is expected given their practice area. The question to be asked is whether education for pharmacists in these latter areas is necessary, especially if they are not specialists in ADHD. It can be argued

that pharmacists would benefit from training in ADHD outside of pharmacological treatments. As the most accessible healthcare professional, pharmacists are likely to be called on by families of patients with ADHD for guidance. Additionally, a collaborative healthcare team approach should be taken between doctor, pharmacist, and therapist to ensure the patient's ADHD is not only being handled through medication therapy, but through a holistic approach. Indeed, it appeared that there was some concern among respondents that there may exist some over-reliance on pharmacological therapies. Future studies should analyze physician-prescribing patterns for children with ADHD and explore the collaborative relationship between physicians and pharmacists who care for children with ADHD. By working in a cooperative and interactive team between doctor, pharmacist, and therapist, the treatment course and outcome for ADHD children can be improved upon and provide life-changing results that empower children.

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APPENDICES

- A. Pharmacist Survey
- B. Pharmacist Invitation Letter
- C. Pharmacist Reminder Letter

Appendix A: Pharmacist Survey

Dear Pharmacist:

Thank you for your interest in participating in this important research study. My name is Anna Crider. I am a PY1 pharmacy student at the University of Mississippi and also a student in the the Sally McDonnell Barksdale Honors College; I am conducting this study to meet the research requirements for my degree. The purpose of this study is to evaluate the perceptions and knowledge of Mississippi pharmacists on the condition of ADHD in children.

This study has been reviewed by The University of Mississippi's Institutional Review Board (IRB). The IRB has determined that this study fulfills the human research subject protections obligations required by state and federal law and University policies. If you have any questions, concerns, or reports regarding your rights as a participant of research, please contact the IRB at (662) 915-7482.

We value your participation in this research study as it will allow us to better understand the pharmacist's knowledge of ADHD medications for children. If you have questions about this study, please contact Anna Crider by email at accrider@go.olemiss.edu. Thank you very much for assisting us with this very important research project.

By clicking the button below, you are agreeing to participate in this research project.

Which of the following best describes your primary practice setting?

- ☐ Chain Community Pharmacy
- ☐ Independent Community Pharmacy
- ☐ Clinic that dispenses ADHD medications
- ☐ Clinic that does not dispense ADHD medications
- ☐ Hospital Pharmacy
- ☐ Other

What is your current age?

Are you:

- ☐ Male
- ☐ Female

Which of the following best describes your race or ethnicity?

- ☐ African American/Black
- ☐ American Indian/Alaskan native
- ☐ Native Hawaiian/Other Pacific Islander
- ☐ Asian/Indian Asian
- ☐ White/Caucasian
- ☐ Hispanic
- ☐ Other

Which of the following best describes your most advanced pharmacy training? (Please check only one)

- ☐ BS in Pharmacy
- ☐ MS in Pharmacy
- ☐ PharmD
- ☐ PhD

In which year did you graduate with your last pharmacy degree?

Was there any instruction devoted specifically to ADHD in children in your pharmacy degree program?

- ☐ Yes
- ☐ Maybe
- ☐ No

For how many years have you been actively practicing pharmacy? Please round to the nearest whole number (i.e., if you have been work for less than a year, indicate 1 year)

What is your pharmacy practice job title?

- ☐ Staff/Employee Pharmacist
- ☐ Manager/PIC
- ☐ Other

I work in a:

- ☐ Metropolitan area (more than 50,000 people)
- ☐ Rural area (less than 50,000 people)

On average, how many prescriptions does your pharmacy fill per week (new and refills)?

On average, how many prescriptions does your pharmacy fill for the treatment of ADHD per week (new and refills)?

Have you ever undertaken a continuing education program or training in the area of ADHD in children?

- ☐ Yes
- ☐ No

Please indicate how familiar you are with each of the following statements by selecting the one choice which best describes your familiarity.

	Extremely familiar	Very familiar	Moderately familiar	Slightly familiar	Not familiar at all
Symptoms of ADHD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Medications that are used to treat ADHD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Side effects from medications used to treat ADHD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Non-pharmacological treatments used to manage ADHD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Screening tools available for ADHD patients	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ADHD resources that can be used by patients and other health care professionals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please indicate whether the following statements are TRUE (T) or FALSE (F)

	True	False	I Don't Know
Children with ADHD have higher-than-normal rates of delinquency and substance abuse	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patients have to exhibit symptoms of ADHD for a minimum of 3 months to be diagnosed with ADHD and receive treatment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Drug therapy only has to be followed by a patient for 10 years, after which the patient will maintain their new non-ADHD behavior	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stimulant medication has been demonstrated to slow growth in children	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Young girls are more likely to be diagnosed with ADHD due to hyperactive behaviors than young boys	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ADHD medications follow a proper dosing protocol as determined by the physician and the dose cannot change even if there are side effects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clonidine and Guanfacine are stimulant medications for ADHD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Strattera (or Atomoxetine) is a selective noradrenergic reuptake inhibitor inhibiting the presynaptic norepinephrine transporter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please indicate the extent to which you agree with each of the following statements by selecting the one option which best describes your opinion.

	Strongly Disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I feel confident in my ability to counsel patients about the medication profile and side effects of medications being used for the treatment of ADHD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel comfortable dispensing medications used in the treatment of ADHD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel that I could benefit from taking a continuing education or training program in the area of ADHD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel that pharmacy school curricula should include instruction in the area of ADHD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please indicate the extent to which you agree with each of the following statements by selecting the one option which best describes your opinion.

	Strongly Disagree	Disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Agree	Strongly agree
I feel there has been a rise in ADHD medication usage by children under the age of 12	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel some doctors or physicians are more inclined than others to write a prescription for ADHD medications for children	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel many children are inappropriately diagnosed with ADHD	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel that physicians and doctors fail to emphasize behavioral therapy in addition to medication therapy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please include any additional thoughts or comments you have about pharmacists' role in the management of ADHD in children.

Appendix B: Pharmacist Invitation Letter

Dear Mississippi Pharmacist:

My name is Anna Crider, I am a PY1 pharmacy student at the University of Mississippi I am interested in understanding your perceptions and knowledge on the condition of ADHD in children. This project is being conducted as part of my honor's thesis requirement. Your participation in this survey is vital in order to determine whether pharmacists are properly equipped with the right information and experience to dispense ADHD medications appropriately.

This study has been reviewed by The University of Mississippi's Institutional Review Board (IRB). The IRB has determined that this study fulfills the human research subject protections obligations required by state and federal law and University policies. If you have any questions, concerns or reports regarding your rights as a participant of research, please contact the IRB at (662) 915-7482. For specific questions about this research project, please call Erin Holmes at 662-915-5914. Completion of this survey is voluntary and your responses will be anonymous.

We have provided the direct link to our survey below. It should take no more than 5 minutes to complete. In the event that you are unable to complete the instrument in one sitting, you may return to the incomplete instrument using the link provided below, which allows you to return to the last prompt attempted. Each and every survey completed and returned helps to ensure we get an accurate assessment of pharmacists' knowledge and opinions.

Your participation and support in this study is greatly appreciated.

Sincerely,

Anna Crider

PY1 Pharmacy Student

University of Mississippi School of Pharmacy

Erin Holmes, PharmD, PhD

Assistant Professor of Pharmacy Administration

University of Mississippi School of Pharmacy

Appendix C: Pharmacist Reminder Letter

Dear Mississippi Pharmacist:

About a week ago you should have received a questionnaire by email asking about your perceptions and knowledge on the condition of ADHD in children. If you have already completed it, please disregard this letter-we thank you for your response. If you haven't, we hope you will consider completing it because each and every survey completed helps to ensure we get an accurate assessment of pharmacists' opinions. The survey (link provided below) should take no more than 5 minutes to complete.

As a current pharmacy student at the University of Mississippi, I am interested in understanding the Mississippi pharmacist community's perspective on ADHD medications prescribed for children. This project is being conducted as part of my honor's thesis requirement.

This study has been reviewed by The University of Mississippi's Institutional Review Board (IRB). The IRB has determined that this study fulfills the human research subject protections obligations required by state and federal law and University policies. If you have any questions, concerns or reports regarding your rights as a participant of research, please contact the IRB at (662) 915-7482.

We have provided the direct link to our survey below. In the event that you are unable to complete the instrument in one sitting, you may return to the incomplete instrument using the link provided below, which allows you to return to the last prompt attempted. Each and every survey completed and returned helps to ensure we get an accurate assessment of pharmacists' opinions.

Sincerely,

Anna Crider

PY1 Pharmacy Student

University of Mississippi School of Pharmacy

Erin Holmes, PharmD, PhD

Assistant Professor of Pharmacy Administration

University of Mississippi School of Pharmacy